



DISCRETE POWER DIODES and THYRISTORS
DATA BOOK



ST300C..C SERIES

PHASE CONTROL THYRISTORS

Hockey Puk Version

Features

- Center amplifying gate
- Metal case with ceramic insulator
- International standard case TO-200AB (E-PUK)

Typical Applications

- DC motor controls
- Controlled DC power supplies
- AC controllers

Major Ratings and Characteristics

Parameters	ST300C..C	Units
$I_{T(AV)}$	650	A
@ T_{hs}	55	°C
$I_{T(RMS)}$	1290	A
@ T_{hs}	25	°C
I_{TSM}	8000	A
@ 50Hz	8380	A
I^2t	320	KA ² s
@ 60Hz	292	KA ² s
V_{DRM}/V_{RRM}	400 to 2000	V
t_q typical	100	μs
T_J	- 40 to 125	°C

650A



case style TO-200AB (E-PUK)

ST300C..C Series

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM} , max. repetitive peak and off-state voltage V	V_{RSM} , maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_j = T_{j\max}$ mA
ST300C..C	04	400	500	50
	08	800	900	
	12	1200	1300	
	16	1600	1700	
	18	1800	1900	
	20	2000	2100	

On-state Conduction

Parameter	ST300C..C	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Heatsink temperature	650 (320)	A	180° conduction, half sine wave
	55 (75)	°C	double side (single side) cooled
$I_{T(RMS)}$ Max. RMS on-state current	1290	A	DC @ 25°C heatsink temperature double side cooled
I_{TSM} Max. peak, one-cycle non-repetitive surge current	8000		t = 10ms No voltage reapplied
	8380		t = 8.3ms
	6730		t = 10ms 100% V_{RRM} reapplied
	7040		t = 8.3ms
I^2t Maximum I^2t for fusing	320	KA ² s	No voltage reapplied
	292		t = 8.3ms
	226		t = 10ms 100% V_{RRM} reapplied
	207		t = 8.3ms
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	3200	KA ² √s	t = 0.1 to 10ms, no voltage reapplied
$V_{T(TO)1}$ Low level value of threshold voltage	0.97	V	(16.7% $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), $T_j = T_{j\max}$.
$V_{T(TO)2}$ High level value of threshold voltage	0.98		($I > \pi \times I_{T(AV)}$), $T_j = T_{j\max}$.
r_{t1} Low level value of on-state slope resistance	0.74	mΩ	(16.7% $\times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)}$), $T_j = T_{j\max}$.
r_{t2} High level value of on-state slope resistance	0.73		($I > \pi \times I_{T(AV)}$), $T_j = T_{j\max}$.
V_{TM} Max. on-state voltage	2.18	V	$I_{pk} = 1635A$, $T_j = T_{j\max}$, $t_p = 10ms$ sine pulse
I_H Maximum holding current	600	mA	$T_j = 25^\circ C$, anode supply 12V resistive load
I_L Typical latching current	1000		

ST300C..C Series

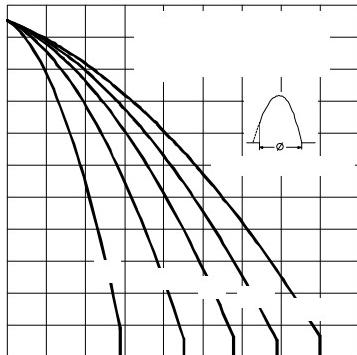


Fig. 3 - Current Ratings Characteristics

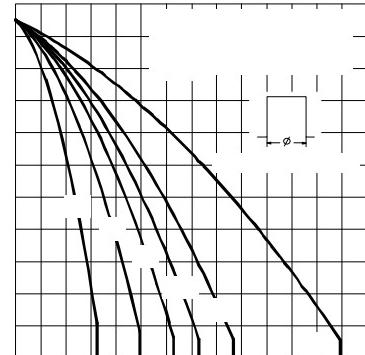


Fig. 4 - Current Ratings Characteristics

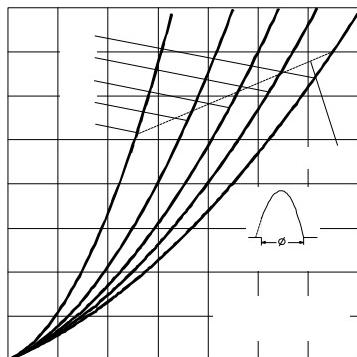


Fig. 5 - On-state Power Loss Characteristics

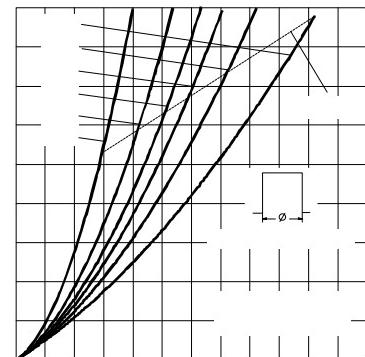


Fig. 6 - On-state Power Loss Characteristics

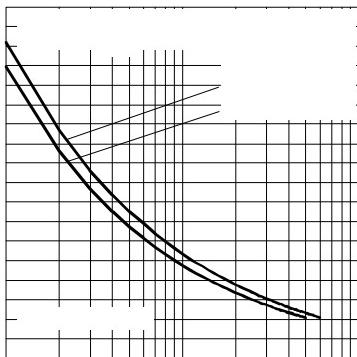


Fig. 7 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

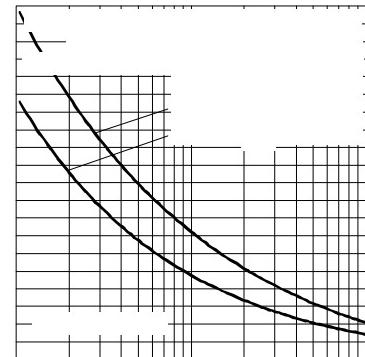


Fig. 8 - Maximum Non-Repetitive Surge Current
Single and Double Side Cooled

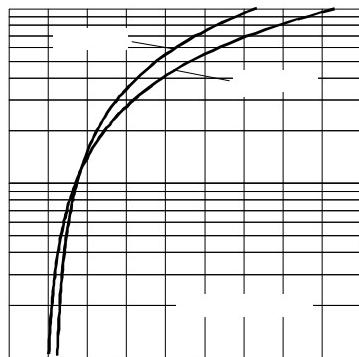


Fig. 9 - On-state Voltage Drop Characteristics

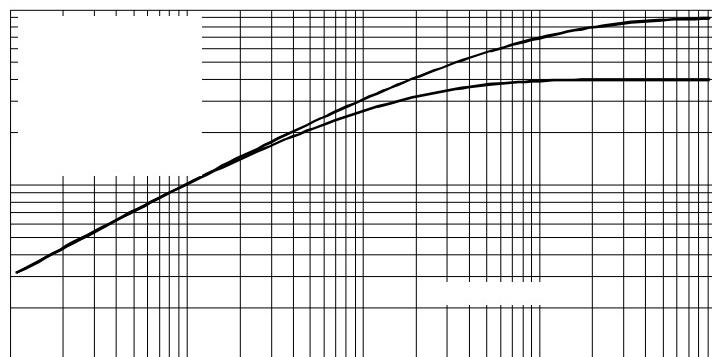


Fig. 10 - Thermal Impedance Z_{thJ-hs} Characteristics

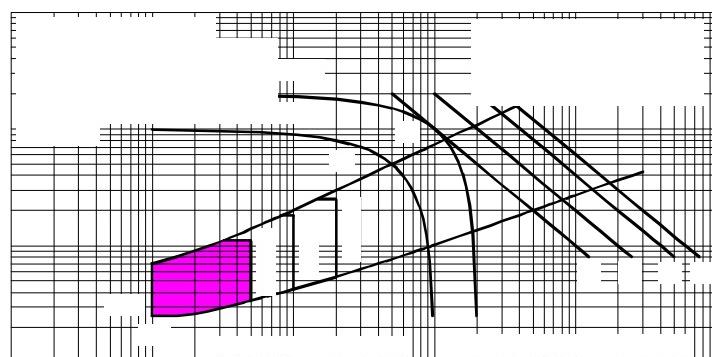


Fig. 11 - Gate Characteristics

ST300C..C Series

Switching

Parameter	ST300C..C	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	1000	A/ μ s	Gate drive 20V, 20Ω, $t_r \leq 1\mu$ s $T_J = T_{J\max}$, anode voltage ≤ 80% V_{DRM}
t_d Typical delay time	1.0	μ s	Gate current 1A, $di_g/dt = 1A/\mu$ s $V_d = 0.67\% V_{DRM}$, $T_J = 25^\circ C$
t_q Typical turn-off time	100		$I_{TM} = 300A$, $T_J = T_{J\max}$, di/dt = 40A/ μ s, $V_R = 50V$ $dv/dt = 20V/\mu$ s, Gate 0V 100Ω, $t_p = 500\mu$ s

Blocking

Parameter	ST300C..C	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/ μ s	$T_J = T_{J\max}$, linear to 80% rated V_{DRM}
I_{RRM} I_{DRM} Max. peak reverse and off-state leakage current	50	mA	$T_J = T_{J\max}$, rated V_{DRM}/V_{RRM} applied

Triggering

Parameter	ST300C..C	Units	Conditions	
P_{GM} Maximum peak gate power	10.0	W	$T_J = T_{J\max}$, $t_p \leq 5ms$	
$P_{G(AV)}$ Maximum average gate power	2.0		$T_J = T_{J\max}$, $f = 50Hz$, $d\% = 50$	
I_{GM} Max. peak positive gate current	3.0	A	$T_J = T_{J\max}$, $t_p \leq 5ms$	
+ V_{GM} Maximum peak positive gate voltage	20	V		
- V_{GM} Maximum peak negative gate voltage	5.0		$T_J = T_{J\max}$, $t_p \leq 5ms$	
I_{GT} DC gate current required to trigger	TYP. 200 100 50	MAX. - 200 -	mA	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$ Max. required gate trigger/ current/voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
V_{GT} DC gate voltage required to trigger	2.5 1.8 1.1	- 3.0 -	V	$T_J = -40^\circ C$ $T_J = 25^\circ C$ $T_J = 125^\circ C$ Max. required gate trigger/ current/voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
I_{GD} DC gate current not to trigger	10.0	mA		
V_{GD} DC gate voltage not to trigger	0.25	V	$T_J = T_{J\max}$ Max. gate current/voltage not to trigger is the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied	

ST300C..C Series

Thermal and Mechanical Specification

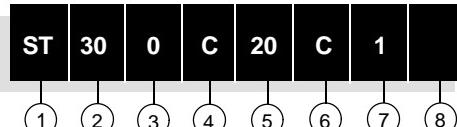
Parameter	ST300C..C	Units	Conditions
T _J	Max. operating temperature range	°C	
T _{stg}	Max. storage temperature range		
R _{thJ-hs}	Max. thermal resistance, junction to heatsink	K/W	DC operation single side cooled DC operation double side cooled
R _{thC-hs}	Max. thermal resistance, case to heatsink		DC operation single side cooled DC operation double side cooled
F	Mounting force, ± 10%	N (Kg)	
wt	Approximate weight		
Case style	TO - 200AB (E-PUK)	See Outline Table	

ΔR_{thJ-hs} Conduction

(The following table shows the increment of thermal resistance R_{thJ-hs} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction		Rectangular conduction		Units	Conditions
	Single Side	Double Side	Single Side	Double Side		
180°	0.010	0.011	0.007	0.007	K/W	T _J = T _J max.
120°	0.012	0.012	0.012	0.013		
90°	0.015	0.015	0.016	0.017		
60°	0.022	0.022	0.023	0.023		
30°	0.036	0.036	0.036	0.037		

Ordering Information Table

Device Code									
									
1	- Thyristor	1	2	3	4	5	6	7	8
2	- Essential part number								
3	- 0 = Converter grade								
4	- C = Ceramic Puk								
5	- Voltage code: Code x 100 = V _{RRM} (See Voltage Rating Table)								
6	- C = Puk Case TO-200AB (E-PUK)								
7	- 0 = Eyelet terminals (Gate and Auxiliary Cathode Unsoldered Leads)								
	1 = Fast-on terminals (Gate and Auxiliary Cathode Unsoldered Leads)								
	2 = Eyelet terminals (Gate and Auxiliary Cathode Soldered Leads)								
	3 = Fast-on terminals (Gate and Auxiliary Cathode Soldered Leads)								
8	- Critical dv/dt: None = 500V/μsec (Standard value)								
	L = 1000V/μsec (Special selection)								

ST300C..C Series

Outline Table

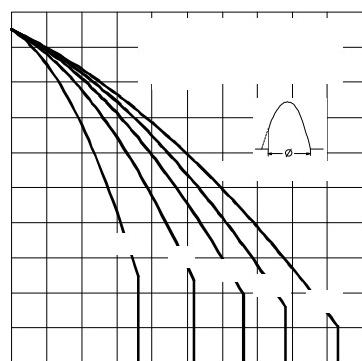
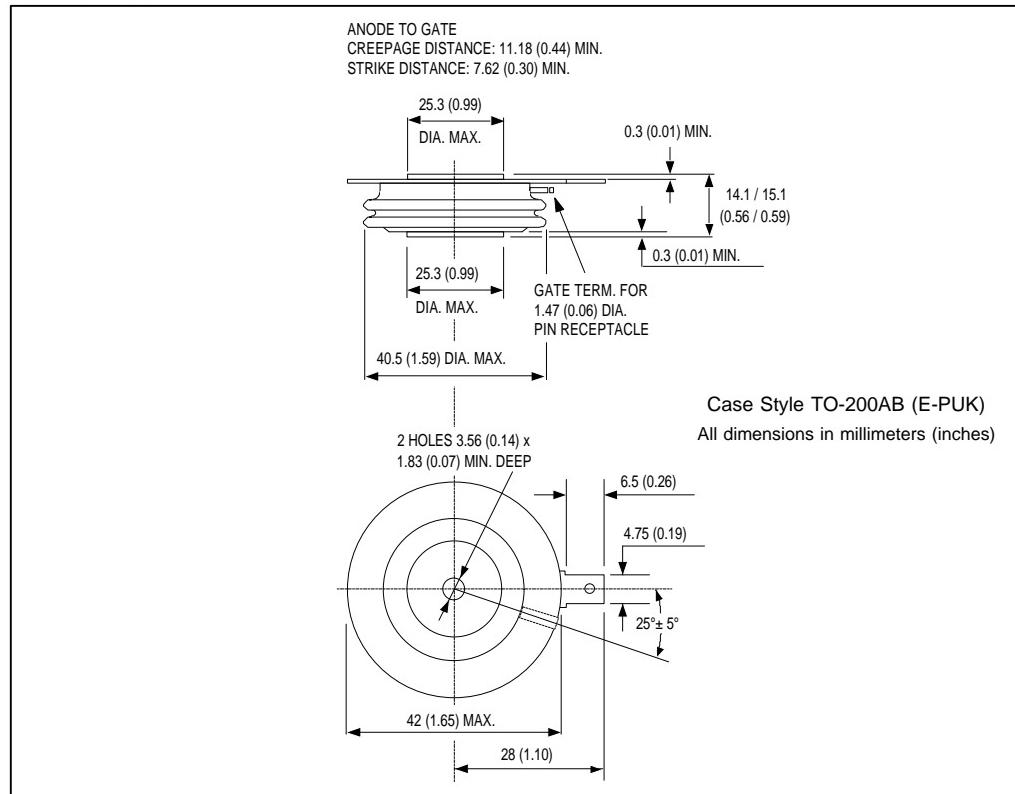


Fig. 1 - Current Ratings Characteristics

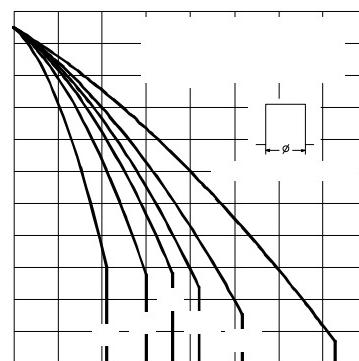


Fig. 2 - Current Ratings Characteristics